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C. PALACHE

*Nature Sketches in Temperate America.* By JOSEPH LANE HANCOCK. Chicago: A. C. McClurg & Co. 1911. Pp. xvii + 451, 12 col. pls., 215 figs.

The preface of this attractive book says that it is a "popular exposition of the facts gleaned from nature" which often presents the subject "from the artistic or æsthetic point of view. This method does not sacrifice truth, which is the religion of science, but mitigates it, bringing about a wider reading circle. . . . More consideration is given to insects than to other groups of animals" and "the relation of animals and plants to their natural surroundings has been kept constantly in mind." The bearing of the subject matter on the theory of evolution is also considered in some detail.

Chapter 1 is devoted to "Evolution and Natural Selection." It gives a brief but complete discussion of the most generally accepted ideas concerning evolution and heredity with a few notes concerning their bearing on the subjects under consideration. Chapter 2 takes up "Adaptations in Plants and Animals, with Examples" and presents some interesting cases of particular adaptations—such as: how the milkweed profits by the visits of its insect guests; bird flowers; and the seasonal procession of flowers, insects and birds. Chapter 3 begins with a brief discussion of the theories of protective resemblance; the tree toad is next described, and the writer then takes up the walking-stick and various other insects and insect larvæ that are protected by their form, color or behavior. Chapter 4 is devoted to mimicry, and after discussing Bates's, Müller's and other theories, describes the monarch and viceroy butterflies, a bumble-bee and a robber-fly, and flower-frequenting flies. Chapter 5 takes up Wallace's theory of warning colors and then passes to a consideration of several bright colored lepidoptera and lepidopterous larvæ. Under the title "Animal Behavior, with Examples,"

Chapter 6 is opened with a brief statement of the author's ideas on instinct and intelligence and a table showing the distribution of sense organs in insects; then follow brief descriptions of the habits of many insects, spiders and birds. Chapter 7 is devoted to "General Observations and Sketches Afield." It considers: the formulation of problems, origin by adaptation in nature, ponds, brooks, meadows, the bumble-bees' night camp, etc. The title of Chapter 8 is "Ecology—Interpretation of Environment as Exemplified in the Orthoptera." In it are discussed the sources of life after glaciation, habitats of plants and animals, zoogeography, nature's reclamation of sterile ground, and various things concerning a number of Orthoptera. The last chapter consists of two parts: (1) a "classified list of habits of various species of Orthoptera based on their egg-laying sites, to show their relation to plant formations in general" (which follows the classifications used by some plant ecologists) and (2) "definitions of common environmental complexes, grouped under formations," in which seventy-six terms (including ocean, sea, lake, pond, pool, stagnant water, snow, alkali, sterile and man's houses) are defined.

The book contains many interesting descriptions of the habits of animals. Among the best of these the parts of chapters on the habits of the walking-stick, the castle-building spider, the golden Spheg as the grasshopper's enemy and the habits of the green meadow grasshopper, may be mentioned. An excellent picture is presented of the life of the animals discussed. The colored plates are excellent, and the same is true of many of the photographic plate illustrations, but some of the latter are so dark that they fail to show the points they are intended to demonstrate.

Hancock presents the theories of natural selection, mimicry and warning coloration in a rather dogmatic fashion and follows them with examples which have not always been indubitably proven to have been brought about in the way he intimates. A reader unfamiliar with the field might easily believe that these dogmas had never been disputed,

for the theories and examples are presented with little comment and the writer is "satisfied to let the reader draw his own conclusions." With what Hancock gives, the reader would doubtless conclude that everything was readily explained by the theories presented—though by this method the theories have the advantage of being clearly and definitely formulated. The reader is rather disappointed when he finds that the hundred-page chapter headed "Ecology—Interpretation of Environment as Exemplified in the Orthoptera" consists mostly of short descriptions of the habits of grasshoppers, and he looks in vain for the "interpretation."

The general reader will probably be confused where such terms as lores, calamus, rachis, vanes, barbs, barbules (p. 46) and luna (p. 60) are introduced without explanation. There is frequent and somewhat monotonous allusion to a "plate photographic illustration" which is often several pages from the reference. The reader would have been saved much time by a page reference. At the top of page 384 reference is made to a plate that appeared in the *American Naturalist* in 1905 but does not appear in the book! Among other loose and careless statements, such as are likely to appear in any first edition, the following may be mentioned: Humming birds are said to occur "in the tropics" and they are found only in America (p. 43). On pages 73 and 75 "this species" is discussed when no species has been mentioned; on page 86 the pronoun "them" refers to "substance." The following sentence occurs on page 299: "The cherries were luciously ripe, and after eating a few, one is apt to feel a dislike for their pungent flavor." "Geophilous" is used to designate animals that feed on the surface of the ground (p. 356), and one wonders how an animal like the earthworm, that eats dirt, would be classified. These definitions are given (pp. 432 and 433): "Desert: Vast sandy tracts of land, appearing in western United States, where evaporation exceeds rainfall. . . . Man's Houses: Country and City Houses; (a) basement; (b) upper floor."

*Rana catesbiana* appears on page 300 as *R. catibiana* and on the plate facing this page as *R. catibiani*. It is difficult to understand the writer's meaning when (p. 356), after stating that short-winged acridians are less numerous in treeless, arid districts than in humid, forested regions and that most flightless species of locusts are plant-feeding as distinguished from ground-feeding, he says: "My own conclusions . . . is simply this: that it is a question of food supply and nutrition derived therefrom. In the case of short-winged forms, they are due to under-development as the result of scant food."

A. S. PEARSE

### SPECIAL ARTICLES

#### ON POWERS OF TEN

For expressing numerically the widely varying magnitudes occurring in scientific work, two methods are in common use. Both are adequate and accurate, but results expressed by means of one are much more easily grasped and remembered than with the other. The more convenient method appears to be gaining in use. The present paper is written with the idea that this desirable change may be accelerated if the advantages of the method are stated, and thus presented to those who have hitherto not given the matter special attention.

The simplest way of writing a number is, of course, to write it out in Arabic notation. But this, in general, involves the presence of numerous ciphers, which the reader must count in order to learn what the number is. There is, therefore, a gain if the writer counts the ciphers for him and records the number obtained. Hence the familiar system, where a number is given as the product of (1) a series of significant digits, and (2) ten, with an exponent (*e. g.*, the velocity of light is  $3 \times 10^{10}$  cm. per sec.).

This system has still one great disadvantage: it calls in each case for the reading of two numbers, and thus greatly increases the strain on both the attention and the memory. And this difficulty is multiplied when the